PROJECT
1534010

OPERATION AND MAINTENANCE PLAN
IN SITU VAPOR EXTRACTION SYSTEM
REMEDIAL DESIGN/REMEDIAL ACTION
SOURCE CONTROL OPERABLE UNIT

HAGEN FARM SITE
TOWN OF DUNKIRK, DANE COUNTY WISCONSIN

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LIST OF ATTACHMENTS

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INTRODUCTION

BACKGROUND

This Operation and Maintenance Plan has been prepared for the in situ vapor extraction (ISVE) system for the Hagen Farm site. The ISVE system will be installed and operated as part of the Source Control Operable Unit.

PURPOSE AND SCOPE

This Operation and Maintenance Plan is part of the ISVE System Design Report and provides information for the operation and maintenance of the ISVE system.

The intent of the ISVE system is to reduce soil contaminated gas migration beyond the limits of the landfill. The purpose of the system is to lower VOC levels and reduce the potential for groundwater contamination. The system includes:

- Eight extraction wells
- Twenty nine gas probe nests
- Buried header pipe
- Condensate knock-out tank
- A blower station

System diagnostics are maintained by sensing devices at critical locations, which report to a central control panel. System problems are reported to operating personnel through telephone telemetry.

The Operation and Maintenance Health and Safety Plan is included in Attachment 2 as a guide for operation and maintenance personnel.

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GENERAL SAFETY PRECAUTIONS

GASES

When working in areas where the presence of soil gas is suspected, monitor with detection instrumentation, and do not provide a source of ignition, such as a flame or spark, for the combustible gas. **Smoking shall not be permitted on the Landfill or at the Blower Station.** Operating personnel should use intrinsically safe flashlights or mirrors, never matches or lighters, to assist in visual inspection.

Prior to entering the blower building, the exhaust fan shall be started and the building door opened. The exhaust fan shall operate for five minutes before anyone is permitted to enter the blower building.

When making repairs, the operator should isolate the repair area from soil gas by closing appropriate valves, plugging pipes, shutting down portions of the system, and providing for proper ventilation. The Operation and Maintenance Health and Safety Plan, located in Attachment 2, should be followed where applicable for the type of repair work involved. Workers should remain alert to other nearby maintenance and construction activities that could damage the control system. Proper care and use of combustible gas detection equipment is important for safe operation and maintenance of the system.

CONDENSATE

The microbiological activity in the landfill generates heat, resulting in an elevated landfill temperature. The vapor extracted from the landfill will therefore be saturated with water vapor at the ambient fill temperature. Soil gas temperature will decrease as it moves through the header pipe, causing vapor to condense in the piping system. This condensate will flow through the header pipe to the

underground condensate knock-out tank. Condensate removed at the blower system will also be directed to the tank.

Condensate may be an irritant when in contact with the skin and precautions must be taken:

- Chemical resistant gloves should always be worn when handling condensate covered materials.
- If condensate is splashed on exposed skin, the affected area should be washed with fresh water as soon as possible.
- In the event condensate enters a person's eyes, the eyes should be flushed immediately, for a minimum of 15 min, and a physician should be contacted.
- Proper personal protective equipment should be used if condensate spray could be encountered. When working in the presence of condensate, it is important to use the proper level of protection.

SYSTEM FAILURE

In the event of system failure (i.e., blower shutdown) vapor extraction will terminate and telemetry will notify operation and maintenance personnel. U.S. EPA and WDNR will be notified according to the procedures set forth in Section 3 of this Operation and Maintenance Plan.

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ISVE SYSTEM

SYSTEM DESCRIPTION

General Description

The ISVE System at the Hagen Farm site is designed to extract soil gases and reduce contaminant migration off-site. At the landfill, soil gas is mechanically extracted through eight vertical extraction wells spaced throughout the fill area at approximately 75 to 150 ft intervals. Extraction well spacing is based on anticipated spheres of influence as determined during the ISVE pilot study.

The ISVE extraction wells are connected to the header pipe system. The header pipe carries the extracted soil gases to the blower station. From there the soil gas is vented to the atmosphere through the stack. Condensate that forms in the header pipe is removed at a condensate knock-out tank. The layout of the ISVE system is shown on Drawing 1534010-D1.

Extraction Wells

The eight vertical extraction wells are constructed of an upper section of non-perforated 4-in. dia Schedule 80 polyvinyl chloride (PVC) pipe extending into a lower section of perforated 4-in. dia Schedule 80 PVC pipe. The well pipes will be placed in 12-in. dia boreholes, with the annular space around the perforated portion of the pipe backfilled with a clean gravel as detailed on Drawing 1534010-D2. The wells will extend to depths of approximately 35 ft.

The wells are connected to the header pipe system by a wellhead piping assembly. Each wellhead will include a flexible pipe connection to the header pipe to allow for differential settlement. A gate valve will be provided at each wellhead for control of the soil gas flow rate. Each wellhead will be equipped with monitoring ports to measure temperature, pressure, flow and soil gas composition.

Header Pipe System

The header pipe system transports the soil gas from the extraction wells to the blower station. The header pipe will be installed in the gravel drainage layer of the existing landfill cover. A continuous warning ribbon and tracing wire will be placed above the pipe to alert excavators of the pipe and aid in locating the pipe in the future. The header pipe will be installed with a minimum slope of 2% to allow for potential differential settlement and for reliable drainage and removal of condensate accumulating in the pipes. An angled pipe connection to the header pipe is included with a bolted flange for access to the header pipe for cleaning.

Blower Station

The blower draws soil gas from the extraction wells and discharges it to the atmosphere through the stack. A flame arrester will be installed at the inlet of the blower to isolate the header system and well field from an explosion, or flame, initiated at the blower. Condensate produced in the blower will be directed to the underground knock-out tank. At the blower station, a monitoring station will be installed after the blower. Sample ports are available on the blower inlet and outlet piping and are located inside the blower building for protection. Passive vents and a exhaust fan are provided for ventilation of the blower building. The exhaust fan switch is located outside the blower building. The fan should be activated 5 minutes and the building doors should be opened prior to and during occupancy of the building. A fire extinguisher will be located inside of the blower building. A volume stick will be located inside the building for use in determining the condensate volume of the storage tank, and the chart showing volume versus depth for the chart will be posted inside the building. A combustible gas monitor will be located in the blower station to continuously monitor the interior air. If combustible gas at a concentration of 10 percent of the lower explosive limit (LEL) or greater is detected, the exhaust fan will be turned on and the telemetry system activated.

Condensate Collection and Conveyance

Condensate, produced by cooling of the saturated soil gas in the header pipe system, is conveyed by gravity through the header pipe to a condensate knock-out tank located near the blower station, where it is removed from the system. The condensate knock-out tank has monitoring for high liquid level and also has interstitial leak detection. The tank has an access port for using the volume stick for manually measuring condensate volume.

System Gas Monitoring

Provisions for monitoring soil gas composition and controlling soil gas flow rates and pressures throughout the ISVE system have been made at the wellheads. That is accomplished by providing sample ports for soil gas sampling and pressure measurement. One port is located on the well side of the gate valve to measure

the applied well vacuum (pressure). The other port is on the riser pipe side of the gate valve for the measurement of available vacuum (pressure) in the header. In addition, temperature, soil gas composition, and flow rate can be measured at the wellhead sample ports.

Monitoring of the ISVE system as a whole will be performed inside the blower building. Monitoring ports will be located on the outlet piping of the blower allowing measurement of soil gas composition, pressure, temperature and flow rate. Monitoring ports are also available on the blower inlet piping to measure soil gas pressure, including pressure drop across the flame arrester, and temperature.

Gas Probe Monitoring

To determine that the ISVE system is properly controlling soil gas migration, it is necessary to monitor the perimeter soil gas probes on a routine basis. Probes will be monitored for soil gas pressure, methane, carbon dioxide, PID readings, and oxygen as described in the Air Emission Monitoring Program, Appendix I.

Telemetry System

A telemetry system will contact operation and maintenance personnel in the event of system shutdown or a high condensate level in the holding tank. ISVE system shutdown can occur due to: high blower temperature; high blower motor temperature; electrical system failure; high condensate level in the knock-out tank; combustible gas in the blower station at a concentration at or above 10% of the LEL; or condensate knock-out tank leakage. If the condensate level in the knock-out tank reaches 600 gal, the telemetry system will call operation and maintenance personnel and the ISVE system will not be shut down. This allows operation and maintenance personnel to arrange to have the knock-out tank pumped before the ISVE system is automatically shut down at a condensate level of 900 gal. In addition to activating the telemetry system, a warning light on top of the control panel will be activated if any situation that shuts down the ISVE system should occur.

OPERATION

Start-Up

Start-up of the ISVE system may be necessary if the system shuts down automatically or is shut down manually for repairs. After initial system start-up, the wells may require a period of time to stabilize while the built-up reservoir of soil gas within the landfill is depleted. The following procedures should be used for initial and subsequent start-up activities.

Initial Start-Up - Initial start-up will include directing flow through one Granular Activated Carbon (GAC) cannister. This GAC cannister will be removed when analytical results show contaminant concentrations are below the NR 445 emission levels, as expected. Initial start-up procedures will follow these steps:

- Open all valves on the blower, piping and extraction wells.
- Follow the procedures outlined by the blower manufacturer for start-up of the blower.
- Close the air dilution valve.
- Balance the system. This includes setting the flow rate at extraction wells EW3, EW4, EW6, and EW7 to 5-10 cfm; and extraction wells EW1AR, EW2, EW5, and EW8 to 15-25 cfm. Start at the wells closest to the blower and proceed outward.

Subsequent System Start-Up - If the entire ISVE system is shut down, it will need to be restarted according to the following steps.

- Rectify all alarm conditions, if any.
- Reattach any flex-hoses which may have been removed during maintenance or repairs.
- Open extraction well gate valves or blower piping ball valves (which may have been closed) to previous settings.
- Follow the procedures outlined by the blower manufacturer for start-up of the blower.
- Proceed with the balancing of the system. This includes setting the flow rate at extraction wells EW3, EW4, EW6, and EW7 at 5-10 cfm; and extraction wells EW1AR, EW2, EW5, and EW8 at 15 to 25 cfm. When adjusting the system, begin at the wells closest to the blower and proceed outward.

Well Start-Up - If a well has been shut down due to maintenance or repair, the following steps should be taken when re-starting the well:

- Inspect the surface of the closed gate valve to verify that there is nothing blocking its free movement, and then open it to its previous setting.

- Proceed with the balancing of the system.

Balancing

Whenever any part of the ISVE system is shut down for more than one day, the entire system may require balancing. Changes in one part of the system will likely affect the entire system. Careful, diligent monitoring is extremely important in operating a dynamic ISVE system, such as this one. In order to balance the system, the following steps should be taken:

- Monitor each well for soil gas pressure, methane, oxygen, carbon dioxide, and flow.
- Compare the measured well pressure, flow, and soil gas compositions to the previously recorded values and adjust accordingly. When adjusting each well, begin at the wells closest to the blower and proceed outward to the ends of the system.
- After adjusting a wellhead, record the soil gas pressure, oxygen, methane, carbon dioxide, and flow at the wellhead. Then go to the next wellhead and repeat the system balancing procedure.
- The ISVE system must be routinely monitored and operating criteria continuously accessed to optimize performance.

Monitoring

The entire ISVE system must be monitored to document that it is operating effectively. An Air Emissions Monitoring Program is include in Appendix I of the RD/RA Design Report. This monitoring should only be performed by trained personnel with the proper equipment. The equipment referenced in subsequent sections of this text are recommended for proper system monitoring. This equipment should be internally calibrated according to the manufacturer's instructions prior to use. Sample monitoring data sheets are included in Attachment 1.

System Monitoring - The capability to monitor and sample the system as a whole is provided at the blower station. The soil gas, methane, carbon dioxide, and oxygen content, flow rate, gas temperature, and vacuum applied to the well field can be monitored at the blower station.

Well Monitoring - All of the soil gas collected by the system is extracted from the wells. Therefore, the monitoring and adjustment of individual wells is the most important aspect of operating the ISVE system. The other system components operate and are adjusted in order to most effectively utilize the wells.

For example, the intake vacuum on the blower is set such that enough vacuum is applied to the wells to produce the desired spheres of influence.

To monitor individual wells, the following steps must be performed:

- Visually inspect the wells for loose bolts, hose clamps, pipe connections, etc.

- Attach a hose to the sample port on the header side of each wellhead valve and connect it to the negative pressure port of the GEM500 Gas Monitor or to a Magnehelic pressure gauge. Record the available header vacuum. In periods of cold weather, ice may form on the inside of the header pipe and may prevent monitoring. Insect nesting may also block openings. If header pressure monitoring is necessary for troubleshooting purposes, unscrew the threaded sample port from the pipe and clear the ice or other blockage with an appropriate tool, if necessary. Visually inspect the sample port to determine whether it is free from ice, or blockage and reattach it. If not, monitor the header pipe directly by inserting the hose directly into the pipe and plugging the annular space around the hose with a rubber stopper or other suitable temporary seal. The seal must be air tight to get an accurate reading. Reattach the threaded sample port.

- Repeat the above procedure with the sample port on the well side of each wellhead valve. Record each well's applied vacuum.

- To measure the flow at a wellhead, utilize the GEM500 Gas Monitor or a portable manometer to measure differential pressure. The Gas Monitor will provide the resulting flow rate. If a manometer is used, a conversion to determine the flow rate will be required.

- Using the sample port on the well side of each wellhead, monitor the soil gas, methane, carbon dioxide, and oxygen content using the Gas Monitor or equivalent equipment.

- Visually inspect each wellhead to determine that all sample ports are closed and all open pipes are sealed against air intrusion.

Shut Down

The entire system or parts of the system should only need to be shut down when maintenance is required. It is important to recognize that soil gas may continue to accumulate after shutting down the ISVE system.

System Shut Down - In the event the blower must be shut down for maintenance or repair, the entire system may need to be shut down. To shut down the entire system perform the following tasks.

- Follow the blower system manufacturers' recommended shut down procedure.
- Close the wellhead valves as necessary to prevent gas from entering the header system.
- Close the blower piping ball valves as necessary.

Well Shut Down - There will be times when a single well will need maintenance and must be disconnected from the rest of the ISVE system.

In order to shut down a single well, proceed with the following steps:

- If a well requires maintenance, close the gate valve at the wellhead and monitor the pressure in the well. If the pressure steadily increases, or is above positive 5 in. WC, vent the well, otherwise keep it closed.

ALTERNATIVE OPERATION

Vapor Treatment System

If the air emissions vented to the atmosphere from the blower fail to meet the requirements of Wisconsin Administrative Code NR 419, the system will be shut down immediately by following the system shut down procedure. The maximum amount of total VOCs that can be emitted to the atmosphere without a permit is 5.7 lb/hr (NR 419) and the maximum amount of total VOCs that can be emitted to the atmosphere is 9.0 lb/hr (NR 419). At the design flow rate of 140 cfm, 5.7 lb/hr total VOCs is equal to analytical laboratory data of 2,600 ppm (volume/volume), and 9.0 lb/hr total VOCs is equal to 4,000 ppm (v/v). If analytical laboratory results from gas samples from the ISVE system are above 2,600 ppm (v/v) total VOCs, the ISVE system will be shut down and a air emission permit application submitted to the WDNR. If analytical laboratory results from gas samples from the ISVE system are above 4,000 ppm total VOCs, the ISVE system will be shut down and a vapor treatment system will be installed after the blower. The calculation for converting the 5.7 lb/hr and 9.0 lb/hr permit standards for total VOCs at the 140 cfm emission rate to a ppm concentration for the system's emissions is included in Appendix J.

Based on the Analytical Laboratory data obtained on gas samples from the Pilot Study, the anticipated maximum amount of total VOCs is 80 ppm. This is significantly below the limit total VOC concentration of 2,600 ppm required for an air emission permit, so it is anticipated that a permit will not be required.

Two blind flanged tees are available on the outlet piping of the blower to allow for diverting gas flow through the treatment system. Each of the tees has a ball valve attached to the blind branch and a ball valve will also be installed between the tees. During normal operation, the valve between the tees will be open and the valves on the blind branches closed. During possible alternative operation of the system with treatment of air emissions, the valve between the tees will be closed and the valves on each tee will be opened. Following hookup of the treatment system, the ISVE system will be restarted according to the start-up procedures. Monitoring during alternative operation will follow the Air Emission Monitoring Program (Appendix I). Sampling methods will follow the Operation and Maintenance Quality Assurance Project Plan (Appendix G).

Pulsed Operation

If air emission analytical data shows that the VOC contaminant concentration remains constant at a low level over a three-month period, the ISVE system will be operated in a pulsed manner. Pulsed operation consists of operating the system for a period of time (active phase) and then shutting the system down for a period of time (rest phase). Shutting the ISVE system down will allow contaminant levels in the landfill to build up before being extracted during the active phase. The duration of both the active and rest phases of pulsed operation will be determined by the contaminant concentration; 1) during normal operation prior to pulsed operation,; 2) during the rest phase of pulse operation; and 3) during the active phase of the pulse operation.

NOTIFICATION OF TEMPORARY SHUT DOWN

If for any reason operation of the ISVE system is interrupted or stopped, except to perform routine maintenance, the U.S. EPA and WDNR will be notified within 24 hours of the shutdown. The U.S. EPA and WDNR will be notified by telephone which will be confirmed in writing within five days after the date of the telephone notification. The U.S. EPA and WDNR will be notified of the nature and cause of the interruption or cessation of operation, as well as the estimated length of time before operation of the ISVE system will resume.

For performance of routine maintenance that requires the system to be shut down for a period of time larger than four hours the U.S. EPA and the WDNR will be notified in writing 48 hr in advance of the shut down. The U.S. EPA and the

WDNR will be notified as to the nature of the maintenance to be performed as well as the estimated length of time before operation of the ISVE system will be resumed.

CORRECTIVE ACTION

The ISVE System is dependent on the integrity of the landfill cover, thus any damage to the landfill cover will result in corrective action to the ISVE System. Damage to the landfill cover includes; erosion of the cover soil, development of cracks in the landfill cover, areas of differential settlement in the landfill cover,, or any other problems that effect performance of the landfill cover. If the ISVE System is affected by the landfill cover damage (pressure loss or increased flow rate), the affected well or wells will be shut down and the entire system adjusted accordingly. Any landfill cover damage will be reported immediately to the owner. The Landfill Cover Operation and Maintenance Plan was included in the Landfill Cover Design Report, July 1991, by Waste Management of North America, Inc.

METHANE CONTINGENCY PLAN

Methane concentrations will be measured at the blower, gas wells and gas probes at the frequency described in the Air Emission Monitoring Program, Appendix I of the Final Design. Methane concentrations are expected to drop to 0-1% within 7-21 days of operation. If methane concentrations at the blower inlet exceed 2-3%, dilution air shall be added by use of the dilution air valve on the inlet piping. Dilution air will be added until methane concentrations in the blower exhaust are at or below 2-3%.

If after four weeks dilution air is still required to reach the desired methane concentrations of 1-2%, consideration will be given to design modifications for long-term methane control and treatment. Methane monitoring at individual wells and gas probes will provide information useful in identifying areas of methane gas generation.

MAINTENANCE REQUIREMENTS

Maintenance Schedule

Vapor Extraction Wells -

Monthly -
- Inspect well for loose bolts, cracks in pipes, air or water leaks in pipes, broken valve handles, evidence of differential settlement,(such as a deflection of the horizontal well pipe), or other evidence of integrity failure.

Quarterly -
- Exercise gate valves by operating it throughout its entire range several times.
- Inspect the integrity of the sample ports.

Knock-out Tank -

Annually -
- Clean out tank and associated piping (e.g., flush out sediment build-up).

Blower Station -

- Follow the manufacturer's written operation and maintenance schedule and recommendations for all equipment.

Quarterly -
- Exercise valve at monitoring station, and ball valves on blower piping.
- Inspect vents to confirm they are free and clear.

System Telemetry

The autodialer may be called at anytime to check the status of the ISVE system. Telemetry may indicate one or more of the following alarm conditions:

- Blower shut down alarm (power failure, high blower temperature, high motor temperature, high liquids level)
- Knock-out tank interstitial leak alarm
- Knock-out tank high condensate level alarm (600 gallons - no shutdown)

- Knock-out tank high condensate level alarm (900 gallons - system shutdown)
- Blower station combustible gas monitor alarm

Alarm conditions may be modified based on manufacturer's recommendations for equipment installed.

A light will illuminate at the control panel during any alarm condition.

Troubleshooting

At times, the ISVE system will react to a situation that was not previously anticipated. The operator must determine the cause of the situation and decide how to remedy the problem. This section is included to provide a procedure for determining the cause of the problem.

Important tools in troubleshooting are the monitoring instruments. After checking instrument operation and calibration, recheck all of the symptoms to make sure a number was not misread or the problem corrected itself. Check the following items first before spending more time determining what happened:

1. Check equipment integrity
2. Check monitoring data

Then follow the outline presented below.

Problem	Investigation/Procedure
Loss of gas flow at blower	• Check wells and piping for liquid problems or frozen conditions
	• Check blower operation
	• Check status of condensate levels
Fluctuating pressure	• Check upstream and downstream piping for large pressure changes to indicate location of liquid blockage.
	• Check knock-out for solids build-up or high liquid.

	• Check surface of landfill for areas of pronounced differential settlement, which may have caused pipe settlement and a liquid blockage.
	• Check blower operation.
Sudden increase in vacuum in a well	• Check if well screen is blinded by liquids in well by measuring liquid level in the well.
	• Check for frozen conditions around well, valve, and flex hose.
	• Reduce well valve setting and check for recovery.
Sudden decrease in vacuum in a well	• Check for change in pressure and flow at wellhead.
	• Readjust well vacuum.
	• Check for liquids build-up.

TERMINATION OF OPERATION

Operation of the ISVE system or individual extraction wells will terminate at a point in time when it is believed that further operation of the system will not decrease contamination at the site. The following criteria will be used in the decision-making process to discontinue operation of individual extraction wells or the entire ISVE system:

- A significant decrease in target VOC exhaust gas concentrations has occurred (approximately 90%) at either individual extraction wells or the blower inlet based on colorimetric tube readings and analytical data, and an asymptotic plateau has been reached (i.e., further decreases are not occurring).

- Concentration rebounds do not occur during pulsed operation at individual extraction wells or following overall system shutdown based on colorimetric tube readings and analytical data.

- A significant decrease in target VOC exhaust gas concentrations has occurred (see above), off-site VOC vapor phase migration is not occurring, and it is determined that the groundwater treatment remedy is sufficient to remove the remaining VOC contaminant mass.

- Target VOCs in the exhaust gas are below analytical detection limits at individual extraction wells following sampling for laboratory analysis.

- Periodic respirometer tests show in-situ biological activity is no longer occurring at significant levels.

Monitoring of the vapor extraction wells and gas probes will continue on a monthly basis for a period of six months after termination of system operation as described in the Air Emission Monitoring Program (Appendix I). If contaminant concentration does not increase in any well or probe, the ISVE system will be permanently shutdown. Permanent shutdown procedures shall be determined at that time.

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ATTACHMENT 2

HEALTH AND SAFETY PLAN

OPERATION AND MAINTENANCE

SUB-ATTACHMENT G

FIELD EMERGENCY RESPONSE PROCEDURES

G

FIELD EMERGENCY RESPONSE PROCEDURES

Based on the type of potential hazards that may be present, the Site Safety Officer (SSO) is to determine if a site specific emergency response plan is necessary prior to the beginning of work. If a site specific plan is necessary, it is to be attached to the Site Safety Plan (SSP).

FIRES AND EXPLOSIONS

Even a minor fire can become a serious problem, particularly when adjacent to flammable or combustible materials. The first few minutes after discovery of a fire are the most critical in preventing a larger emergency.

In case of a fire or explosion, immediately turn off burners and other heating devices and stop any work in progress. Give priority to assisting injured persons.

Small Fires
Take the following actions immediately:

- Alert other personnel in the vicinity and send someone for assistance
- If it is a small fire - one that can be extinguished within 30 seconds or with one fire extinguisher - attempt to extinguish the blaze if:
  - Conditions are safe
  - You have the proper type of fire extinguisher
  - You have been trained to use a fire extinguisher properly

- You are not alone

The combination (ABC) extinguishers can be used against the following classes of fires:

- Class A fires - ordinary combustible solids such as paper, wood, coal, rubber and textiles
- Class B fires - petroleum hydrocarbons (diesel fuel, motor oil and grease) and volatile flammable solvents
- Class C fires - electrical equipment

These extinguishers, however, are not effective against Class D fires which include combustible or reactive metals (such as sodium and potassium), metal hydrides or organometallics. Special Class D extinguishers are required.

Avoid entrapment by a fire; always fight from a position accessible to an exit.

If there is any chance that the fire can not be controlled by locally available personnel and equipment, the following action should then be taken:

- Activate the emergency alarm system (if available) and notify the local fire department.
- Confine the emergency to prevent further spread of the fire.
- Assist injured personnel and provide first aid or transportation to medical aid, if necessary.

Next notify client if the client is in close proximity to the fire. (If not, notify the fire department). Assess the need with the client to contact the fire department. If the fire department is contacted, be prepared to tell them:

- Who you are
- Your location
- Type of fire (i.e., electrical, chemical, combustible solids, vapor)
- If the fire is extinguished
- The need for medical assistance

- Other potential hazards in the area (i.e., proximity to bulk tanks, downed electrical lines, poor access)
- What you will be doing after you hang up the phone and where they can find you or reach you

Upon arrival of the local fire department, brief them of the incident. When given permission, contact the Project Manager (PM) or in the PM's absence, the Office Supervisor or Corporate Health and Safety Manager.

Large Fire or Explosion

If other people are in the area, immediately notify them and then call the local fire department. Be prepared to tell them:

- Who you are
- Your location
- Type of fire (i.e., electrical, chemical, combustible solids, vapor)
- If the fire is extinguished
- The need for medical assistance
- Other potential hazards in the area (i.e., proximity to bulk tanks, downed electrical lines, poor access)
- What you will be doing after you hang up the phone and where they can find you or reach you

Upon arrival of the fire department, turn over command to them and supply as much information as possible. When given permission, contact the PM or in the PM's absence, the Office Supervisor or Corporate Health and Safety Manager. Get a number where they can again be reached.

FLAMMABLE/COMBUSTIBLE LIQUID SPILLS

If a spill of a flammable or combustible liquid occurs, all possible sources of ignition should be extinguished or removed immediately.

Use Chemtox Data Sheets, available in Appendix A, analytical information from laboratory personnel, and any other available sources of information, together

with your own expertise to determine if spill control and clean up can be safely accomplished with the personnel and materials on site.

The following general spill clean up procedures can be utilized, but more specific techniques might be required for certain chemicals.

- Vermiculite or other suitable absorbent may be used to solidify free liquids.
- Both spilled liquids and solids residues must be contained in drums.
- If a spill occurs on soil, it must be scraped and contained.

EVACUATION

Prior to beginning work, the SSO should brief all subcontractor employees on what the evacuation signal should be. It may be nothing more than a verbal command or it may be some audible alarm such as a bell or horn. If working at a client's site, familiarize yourself with their warning system.

Prior to work, the SSO should determine a meeting place if evacuation is necessary. Preferably the meeting place should be upwind of the work activities and at a safe distance. All subcontractor employees should be informed of the meeting location.

If evacuation is necessary, everyone should go directly to the meeting area. The SSO should ensure all personnel are accounted for. This will mean checking the sign-off documentation on the Site Safety Plan or on larger jobs the daily sign-in roster. The local on-scene commander should immediately be notified of any missing personnel as well as their last known whereabouts.

Site Evacuation

If an evacuation of the site is necessary, certain rules must be strictly followed:

- Employees in the vicinity should immediately shut down all equipment and disconnect electrical or flammable power sources to machinery.
- Immediately after personnel are alerted, they will evacuate the facility via the nearest escape route.
- All evacuated personnel will assemble at the predetermined meeting place.

- Employees should not wait for friends; the Site Safety Officer will ensure all personnel have evacuated before departing.
- Employees should move quickly and calmly without panic.
- Employees should not smoke.
- Once assembled, employees should remain calm and quiet while the Site Safety Officer takes roll call and assesses the situation. Each employee must report to the Site Safety Officer until everyone is accounted for and evacuation is complete.

Off-Site Evacuation

If an incident is large enough, off-site personnel may also need evacuation. If off-site evacuation is necessary, follow the appropriate local notification procedures, generally through the fire department. Personnel should not attempt to evacuate off-site personnel but should leave that task to the local authorities. All employees should follow the evacuation directions given by the local authorities. The Site Safety Officer should offer to remain at the command post to supply information. If told to leave, the SSO should leave.

Local authorities will have present an on-scene commander. The on-scene commander will direct emergency operations and will have assistance from the local fire department, police department and emergency government.

After evacuating to a safe area, the PM should be contacted or in the PM's absence, the Office Supervisor or Corporate Health and Safety Manager.

DISCUSSION OF INCIDENT

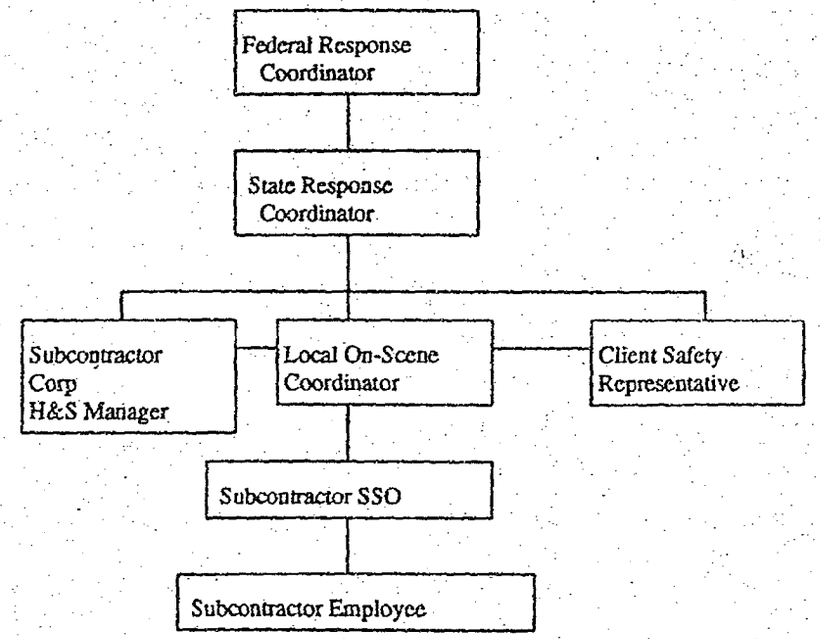
At no time should an employee discuss an emergency incident with members of the media. Politely refuse to discuss the situation and instead, direct all inquiries to the Corporate Health and Safety Manager. Provide the media people with the office phone number.

However, employees should always provide whatever useful information they can to response personnel. Stick to helpful facts and avoid placing blame or judgement. That will be sorted out later. Politely refuse to find fault or place blame.

At a safe place and at the appropriate time, write down all you remember of the incident. How did it happen? Who was doing what? What did I see? What did I hear? All these types of things may be important later when things are sorted out.

CHAIN-OF-COMMAND

The number of people involved in an incident will be directly related to the severity of the incident. In the event of an incident, the chain-of-command could be as extensive as:



Upon arrival of the local on-scene coordinator or client safety representative, the subcontractor SSO should turn over command of the situation. The responsibility of the subcontractor SSO is then to supply information and offer supplies and personnel if requested. It is likely the local on-scene coordinator or client safety representative will not request subcontractor personnel but may request supplies (HNu, absorbant, drums). In a major incident, it is likely the subcontractor Health and Safety Manager will arrive at the scene. At that time, all responsibilities of the SSO should be turned over to the Health and Safety Manager.

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